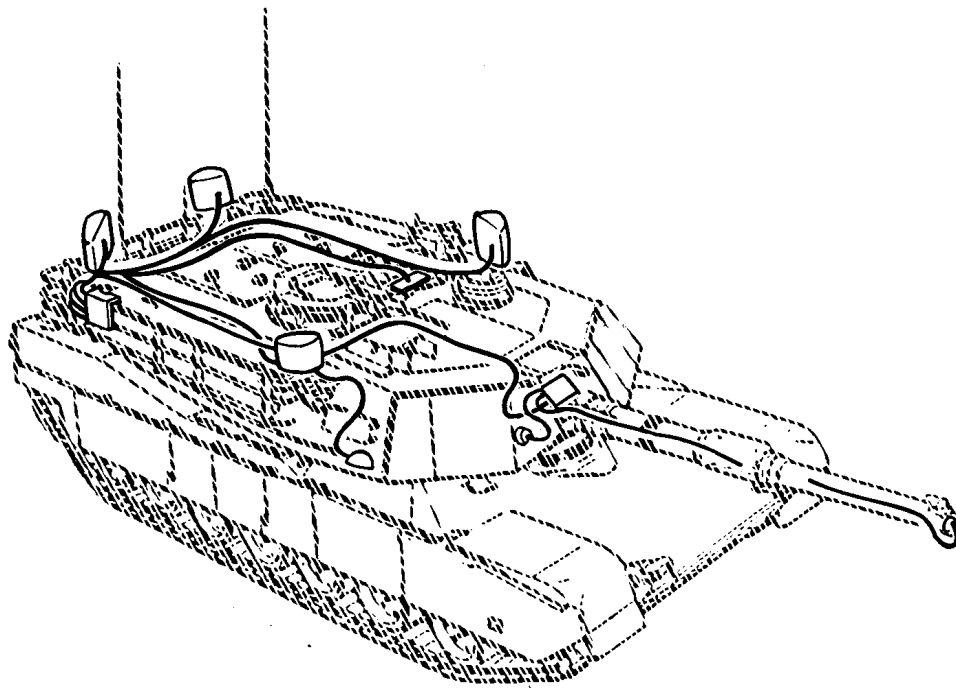


**OPERATOR'S TRAINING COURSE  
FOR  
TANK WEAPON GUNNERY SIMULATION SYSTEM  
(TWGSS)**

for

**TANK, COMBAT, FULL-TRACKED: 120-MM GUN, M1A2**



31 DECEMBER 1995

**FOR INFORMATION ON FIRST AID, REFER TO FM 21-11.**

## **CABLE CONNECTORS**

### **WARNING**

**DO NOT** connect or disconnect cable connectors unless vehicle master power switch and turret power switch are in **OFF** position and gun/turret drive switch is in **MANUAL** position. Failure to follow this warning may result in injury or death to personnel if main gun or turret move suddenly.

## **HOFFMAN DEVICE**

### **WARNING**

**ALWAYS** refer to the Improved Tank Gunfire Simulator (ITGS)(Hoffman Device) operator's manual (see TD 17-6929-702) prior to installing, removing, loading, or firing simulator. Failure to follow this warning may result in injury or death to personnel.

### **WARNING**

**ALWAYS OBSERVE** safety zone of 50 meters to the front of the tank and 25 meters to left and right of the main gun, when installing, removing, loading, and firing the Improved Tank Gunfire Simulator (Hoffman Device). Failure to follow this warning may result in injury or death to personnel.

### **WARNING**

**DO NOT** connect or disconnect Improved Tank Gunfire Simulator (Hoffman Device) unless vehicle master power switch is in **OFF** position and simulator safety switch is in **OFF** position, with key removed. Failure to follow this warning may result in injury or death to personnel.

## **LASER RANGEFINDER (LRF) EYE-SAFE LASER FILTER (ELF)**

### **WARNING**

**Tank MUST** be equipped with LRF ELF during **ALL** training exercises. Failure to follow this warning may result in injury or blindness to personnel.

## **SYSTEM INSTALLATION AND REMOVAL**

### **WARNING**

**Turret power switch, vehicle master power switch, and turret utility power switch must be in OFF position before installing or removing system components. Failure to follow this warning may cause turret or main gun movement, resulting in injury or death to personnel.**

### **WARNING**

**Gun must be locked to turret roof and turret traverse lock must be engaged before installing or removing components/cables under main gun. Failure to follow this warning may result in injury or death to personnel.**

### **WARNING**

**If a fire control malfunction is indicated on the commander's integrated display (CID), commander's independent thermal viewer (CITV), gunner's control and display panel (GCDP), or in gunner's primary sight (GPS), IMMEDIATELY set gun/turret drive switch to MANUAL position and vehicle master power switch to OFF position. Failure to follow this warning may cause turret or main gun movement, resulting in injury or death to personnel.**

## **SYSTEM STARTUP**

### **WARNING**

**Ensure that ALL cables between tank and the Tank Weapon Gunnery Simulation System (TWGSS) are properly connected before turning on vehicle master power switch. Failure to follow this warning may cause turret or main gun movement, resulting in injury or death to personnel.**

## **TRANSCIVER UNIT**

### **WARNING**

**Transceiver unit has an eye-safety classification of 3A. During operation, DO NOT view the transceiver unit with an unaided eye for an extended period of time. DO NOT AT ANY TIME view the transceiver unit with an aided eye, i.e., optics which magnify from a distance less than 25 meters.**

**OPERATOR'S TRAINING COURSE  
FOR  
TANK WEAPON GUNNERY SIMULATION SYSTEM  
(TWGSS)**

**for**

**TANK, COMBAT, FULL-TRACKED: 120-MM GUN, M1A2**

**TABLE OF CONTENTS**

PREFACE	.....	iii
CHAPTER 1	INTRODUCTION TO TWGSS .....	1-1
CHAPTER 2	PREPARATION OF M1A2 .....	2-1
CHAPTER 3	PREPARATION FOR OPERATION (PMCS) .....	3-1
CHAPTER 4	INSTALLATION OF TWGSS .....	4-1
CHAPTER 5	STARTUP AND ALIGNMENT .....	5-1
CHAPTER 6	OPERATION OF TWGSS .....	6-1
CHAPTER 7	POST OPERATIONAL PROCEDURES .....	7-1
CHAPTER 8	TROUBLESHOOTING .....	8-1
CHAPTER 9	PREPARATION OF TARGETS .....	9-1
CHAPTER 10	OPERATION OF CONTROL GUN (CGUN) .....	10-1
CHAPTER 11	PRESENTATION OF EQUIPMENT .....	11-1
CHAPTER 12	TRAINING DATA RETRIEVAL SYSTEM (TDRS) COMPUTER UNIT .....	12-1
CHAPTER 13	SETUP .....	13-1
CHAPTER 14	AFTER ACTION REVIEW (AAR) LIST .....	14-1
CHAPTER 15	AFTER ACTION REVIEW (AAR) MAP .....	15-1

## **PREFACE**

### **1-1. GENERAL.**

This training course is designed to provide a systematic approach to training M1A2 tank crews in the use of the Tank Weapon Gunnery Simulation System (TWGSS). Each lesson in the training course includes lesson plans, instructor notes, and viewgraphs. The use of the lesson package will allow the trainer to tailor lessons based on his unit's particular training needs. TWGSS training standards are discussed in detail to promote standardization in training with TWGSS. Proper application in the use of TWGSS will provide the commander with an effective training tool with which to train tanks crews in precision gunnery skills.

### **1-2. PURPOSE.**

The purpose of this training course is to assist unit instructors in conducting TWGSS equipment training. Further objectives of this training course are to:

- a. ensure TWGSS equipment training is technically correct and meets both soldier's and unit's needs;
- b. employ training techniques which will reduce training time and conserve training resources;
- c. standardize TWGSS training to ensure it is compatible with other laser-based training systems employed by combat and combat support branches of the Army and Marine Corps; and,
- d. reduce instructor preparation time by providing lesson plans, viewgraphs, training resources lists, and other training support information.

### **1-3. TWGSS EQUIPMENT TRAINING.**

- a. **Technical Proficiency and Standards.**
  - (1) The value of TWGSS training depends on users' proficiency with and understanding of the TWGSS equipment. It is possible to conduct precision gunnery training with a limited understanding of how TWGSS works; however, the cost of incomplete or inadequate training causes the following:
    - (a) **Reduced availability of TWGSS equipment.** Improper preoperation inspections and troubleshooting results in equipment damage or total equipment failure. The cost of repairing these damages places a large demand on the unit's maintenance systems both in dollars and manpower.

### 1-3. TWGSS EQUIPMENT TRAINING (Con't).

- (b) Reduced training effectiveness. The crew's inability to conduct proper preoperation checks or their inability to properly place TWGSS into operation reduces the accuracy of the overall system. This causes frustration among the crew and reduces the effectiveness of the training.
  - (c) Reduced training interest. TWGSS has the potential to make gunnery training exciting and interesting for the crew. An inoperable TWGSS results in boredom and frustration. Tank crews that practice skills that lead to improper mounting and alignment quickly become discouraged and lose interest in training.
- (2) Standardization of TWGSS training reduces or eliminates the problems covered above by focusing on two critical areas of training. These are:
  - (a) conducting thorough preoperational checks and inspections; and,
  - (b) mounting and operating TWGSS properly.
- b. **Demonstrations.** Each period of training should begin with detailed demonstration of how to inspect, inventory, and conduct preoperational checks on TWGSS equipment. These checks are critical to successful TWGSS training and need to be stressed.
- c. **Practical Exercise.** Following the demonstration of preoperational checks and inspections, a detailed demonstration and practical exercise on how to mount and place TWGSS into operation follow. This portion of instruction also covers the alignment of TWGSS to the fire control system of the host tank. Emphasis must be placed on how to mount TWGSS in a manner which will keep it from being broken or damaged during training and not interfere with the operation of the weapon system.

### 1-4. UNIT TRAINING PROGRAM.

To achieve maximum benefit from TWGSS training, it must be integrated into the unit training program. However, specific training guidance as outlined in this training course must be followed by the instructors.

### 1-5. SCOPE OF INSTRUCTION.

The scope of instruction must be adjusted to meet the unit's specific training needs. Table 1 on page v identifies the lessons in the M1A2 TWGSS training course.

- a. **Equipment Required.** Each lesson has its own equipment requirements. Specific items needed to effectively conduct TWGSS training are outlined in detail in each lesson plan.

### 1-5. SCOPE OF INSTRUCTION (Con't).

- b. **Schedules.** Prior to scheduling any training, review the resource requirements and confirm training areas, pyrotechnics (if used), and TWGSS equipment are available on the dates required.
- c. **Instructor Selection.** Whenever possible, select instructors who are current in TWGSS training. If none are available, attempt to locate NCOs who have received training at a service school or academy.
- d. **Uniform and Equipment.** The uniform and equipment required for student personnel must be identified and complete. Specific equipment requirements are outlined in each lesson plan in the training course. TWGSS training uniform and equipment should be included on the unit's training schedule.

**Table 1. TWGSS Operator's Training Course.**

No.	Lesson	Time (H)	Personnel To Be Trained
1	Introduction to TWGSS	1.0	Crews, Instructors, TSC Personnel
2	Preparation of M1A2	1.5	Crews, Instructors, TSC Personnel
3	Preparation for Operation (PMCS)	1.0	Crews, Instructors, TSC Personnel
4	Installation of TWGSS	3.0	Crews, Instructors, TSC Personnel
5	Startup and Alignment	3.0	Crews, Instructors, TSC Personnel
6	Operation of TWGSS	3.0	Crews, Instructors, TSC Personnel
7	Post Operational Procedures	1.0	Crews, Instructors, TSC Personnel
8	Troubleshooting	1.5	Crews, Instructors, TSC Personnel
9	Preparation of Targets	1.0	Crews, Instructors, TSC Personnel
10	Operation of Control Gun (CGUN)	1.0	Instructors, NCOs, TSC Personnel
11	Presentation of Equipment	1.5	Instructors, NCOs, TSC Personnel
12	Training Data Retrieval System (TDRS) Computer Unit	1.0	Instructors, NCOs, TSC Personnel
13	Setup	3.0	Instructors, NCOs, TSC Personnel
14	After Action Review (AAR) List	4.0	Instructors, NCOs, TSC Personnel
15	After Action Review (AAR) Map	5.0	Instructors, NCOs, TSC Personnel

## 1-6. TRAINING GUIDANCE.

- a. **Time and Date.** Immediately after scheduling the training, inform each instructor (and alternate) of the time and date of TWGSS training.
- b. **Location.** Training site requirements vary for the lessons being trained. Ensure that the proper ranges/training areas are available, serviceable, and satisfy the training lesson to be taught.
- c. **TWGSS Instructors.** It is important that the instructor assigned to teach TWGSS be fully qualified on TWGSS. To ensure that effective training is conducted, qualified instructors must be identified early in the planning and scheduling phase. Time and resources permitting, rehearsals of all instruction should be conducted.

## 1-7. SAFETY.

- a. **TWGSS General Safety Regulations.** General safety regulations as they apply to TWGSS are included in each lesson and are reinforced by both primary and assistant instructors.
- b. **Transceiver Unit Laser.** The TWGSS transceiver unit laser has been certified as eye-safe; nevertheless, some precautions are necessary. Do not fire the transceiver unit at personnel closer than 9 m or at tank optics or binoculars within 25 m.
- c. **Blank Ammunition.** TWGSS does not require the use of blank ammunition. Units may elect to use blanks to provide additional realism in training. When using blanks, never fire them at personnel or equipment at close ranges. Enforce established blank-firing safety precautions.
- d. **Improved Tank Gunfire Simulator (ITGS) (Hoffman Device).** Stay 25 m from the sides and 50 m from the front of the Hoffman Device muzzle. The muzzle blast can damage hearing and cause injury from flying debris.
- e. **Maneuver.** The use of TWGSS during force-on-force training may cause violent evasive maneuvers in response to NEAR MISS signals. Therefore, leaders must enforce appropriate safety regulations, especially around vehicles and equipment.

## 1-8. LIST OF ABBREVIATIONS.

AAR	After Action Review
BIT	Built-In Test
CID	Commander's Integrated Display
CITV	Commander's Independent Thermal Viewer
CGUN	Control Gun
CLS	Contractor Logistics Support
ELF	Eye-Safe Laser Filter



## 1-8. LIST OF ABBREVIATIONS (Con't).

FCEU	Fire Control Electronics Unit
FCS	Fire Control System
GAS	Gunner's Auxiliary Sight
GCDP	Gunner's Control and Display Panel
GPS	Global Positioning System
GPS	Gunner's Primary Sight
HDDU	Hull Defilade Detector Unit
IAW	In Accordance With
ITGS	Improved Tank Gunfire Simulator (Hoffman Device)
LOS	Line of Sight
LTID	Laser Target Interface Device
LRF	Laser Rangefinder
MILES	Multiple Integrated Laser Engagement System
NMC	Not Mission Capable
PGS	Precision Gunnery System
PMCS	Preventive Maintenance Checks and Services
RDU	Retro Detector Unit
RSI	Remote System Interface
TBOS	Tracer, Burst, Obscuration Simulator
TCE	Tank Crew Evaluator
TCU	Target Computer Unit
TDRS	Training Data Retrieval System
TEU	Turret Electronics Unit
TIS	Thermal Imaging System
TNB	Turret Networks Box
TPS	Turret Position Sensor
TRU	Thermal Receiver Unit
TSC	Training Support Center
TU	Transceiver Unit
TWGSS	Tank Weapon Gunnery Simulation System
UTM	Universal Transverse Mercator
VIU	Vehicle Interface Unit